

## WEB NARRATIVES: TOPIC 2 (FIELD GUIDE)

### Types of Historic Bridges in Minnesota

Minnesota has more than 20,000 bridges. Of these, about 1% are considered significant to our engineering and transportation heritage. This guide identifies basic materials and span types in Minnesota, helping you to appreciate historic bridges as you travel the state.

In its most basic definition, *a bridge is a structure that carries a pathway or roadway or railroad over a depression or obstacle*. This definition can be used to describe everything from a fallen tree over a creek to the massive structures over the Mississippi River. To be considered a bridge by the State of Minnesota, a structure must have a span of 10 feet or more.

A bridge is comprised of two basic components, the *substructure* and *superstructure*. The *substructure is what the superstructure rests on*. It includes the *abutments* at each end of the bridge and, if the bridge has more than one span, *piers or bents* that support the spans. *The superstructure is the portion of the bridge that carries the traffic load and passes the load to the substructure*.

As structures, bridges can be classified in several different ways: by use, span type, or construction material. Use can include pedestrian, bicycle, vehicular (automobiles and trucks), railroad, or a combination. Classifications by span type or materials are discussed below.

### MATERIALS

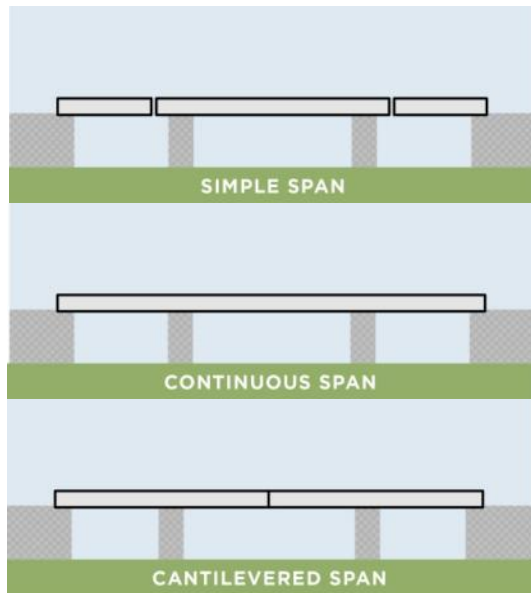
Bridges in Minnesota are constructed from four types of materials: wood, masonry (brick, stone), metal (iron and steel), and concrete. The use of these materials can give you a sense of the time period when it was built.

- Wood: Pre-European contact period (logs), and from 1830 to the present (timbers)
- Masonry: 1863-1945
- Iron: 1873-1890
- Steel: 1890-present
- Concrete: 1900-present

### SPAN TYPE

A span is the space between the bridge's supporting substructure (between piers in a multiple span bridge or between abutments with a single span bridge). Spans can consist of different components including:

- Arch - a curved structural element that extends over an opening and serves as a support.
- Girder/Beam - a horizontal structural element that supports vertical loads by resisting bending.
- Slab - a reinforced concrete floor/platform that crosses beams or piers.
- Truss - a supporting structure or framework composed of beams/girders set in a single plane, generally with triangular-shaped components.



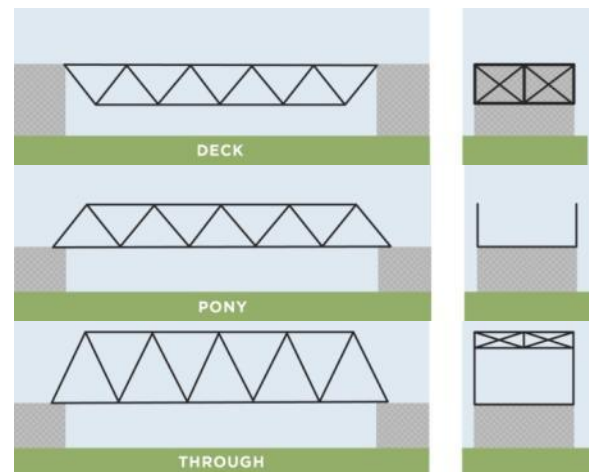
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There are three main types of spans: simple, continuous, and cantilevered. Any of these spans can be constructed with beams, girders, or trusses.

- **Simple span** - a superstructure that is completely supported between two vertical supports.
- **Continuous span** - a superstructure that extends uninterrupted over one or more vertical supports.
- **Cantilevered span** - a superstructure that projects beyond the vertical support and is counterbalanced and/or supported at only one end.

The three main types of spans can have different travel surface configurations, including:

- **Deck** - is a structure whose supporting elements (trusses, girders, and arches) are located below the roadway/tracks.
- **Pony (trusses only)** - is a structure whose load-bearing superstructure is composed of a truss with no top bracing.
- **Through** - is a structure where the roadway/tracks pass between the supporting elements, such as trusses, girders, or arches.



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*When examining bridges, be sure to examine them carefully as some may have a veneer or facade obscuring the underlying span.*

## REPRESENTATIVE HISTORIC BRIDGE TYPES IN MINNESOTA

### *Trusses*

- Deck truss



Deck Truss. Bridge 94246, Minneapolis, Hennepin County

- Pony truss



Pony Truss. Bridge L0885, Phelps Mill, Otter Tail County



- Through Truss



Through Truss. Bridge 89850, Redwood Falls, Redwood County

### ***Arches***

- Masonry arch



Masonry Arch. Bridge L4013, Houston County

- Steel arch



Steel Arch. Bridge 5756, Minneapolis, Hennepin County

- Concrete arch



Open Spandrel Concrete Arch. Bridge 448, Oronoco, Olmsted County





Closed Spandrel Concrete Arch. Bridge L5722, Minneapolis, Hennepin County



Concrete Rainbow Arch. Bridge 7423, Itasca County

***Slab, Beam, Girder, and Rigid Types***

- Rigid frame



Steel Rigid Frame. Bridge 27552, Bloomington, Hennepin County



Concrete Rigid Frame. Bridge 9155, Minneapolis, Hennepin County



- Concrete girder/beam



Concrete Girder/Beam. Bridge 5151, Marshall, Lyon County



Concrete Girder/Beam. Detail of Bridge 5151, Marshall, Lyon County



- Concrete slab



Concrete Slab. Bridge 9103, Goodhue County

- Steel girder/beam



Steel Girder/Beam. Bridge 5923, Cook County

- Tunnel



Tunnel. Bridge 27832, Minneapolis, Hennepin County

### ***Movable Span***



Movable Span. Bridge 4654, Stillwater, Washington County





Movable Span. Bridge L6116, Duluth, St. Louis County

### ***Suspension***



Suspension Bridge. Bridge R0657, Granite Falls, Yellow Medicine and Chippewa Counties  
(Source: Summit Envirosolutions, Inc.)

## ***Timber***



Timber Bridge. Chimney Rock Pedestrian Bridge, Whitewater State Park, Winona County

## ***Culvert***



Concrete Box Culvert. Bridge 5722, Spring Valley, Fillmore County





Multi Plate Steel Pipe Arch Culvert. Bridge 5827, Zumbro Falls, Wabasha County